

# Homework 1 : Due Feb. 7, 2011

CS 778 / 578

January 28, 2011

Display all results by using 'imagesc' and 'colormap(gray)'. Submit all Matlab code and a report containing all requested images via ecampus.

## 1 Load Volume Data

Load the sample dataset given on the class webpage. The file is a sequence of unsigned bytes with no header. Reshape the data into a 3d array ( $181 \times 217 \times 181$ ). Extract axial slice 90 ( $z = 90$ ) of the dataset, normalize so that intensities are in the range  $[0, 1]$  and display.

## 2 Perona-Malik diffusion process

Implement the 2D diffusion process given in equation (7). Generate a noisy image by adding zero-mean Gaussian noise with variance = 0.005 to the slice extracted in Part 1.

Show the following images:

- Display the image of the conduction coefficient  $c(x, y)$ .
- Iterate the diffusion equation for 100 iterations. Display every 10th image.
- Be sure to note parameter values used to generate all images.

Collect the images into a report (pdf or doc format). Specify which parameter values were used to generate each image.

## 3 If you are registered for CS 778

Also implement the Perona-Malik filtering in implicit form. Set the timestep to  $\lambda = 0.25, 0.5,$  and 1.0 and generate images for every 10th iteration.

## 4 Submit

Submit your code and report via ecampus by midnight on the due date.